SECTION 34 40 00

TRANSPORTATION SIGNALING AND CONTROL EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of existing traffic control signal at US Route 1 (Orange Avenue) and Rockview Street intersection.

B. Installation of all new traffic control signal equipment.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

B. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.

C. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

D. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.

1.03 REFERENCE STANDARDS

A. Office of State Traffic Administration (OSTA) regulations and Connecticut Department of Transportation (ConnDOT) Traffic Control Signal Design Manual.

B. Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) 2009 and supplemental errata.

C. State of Connecticut Department of Transportation, Form 816 “Standard Specifications for Roads, Bridges and Incidental Construction” 2004, and supplemental specifications incidental thereto.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Working drawings for the following items:
   1. Aluminum pedestals and foundations.
   2. Span poles and foundations
   3. Vehicular and pedestrian traffic signals.
   4. Controller equipment, cabinet and foundation.
   5. Handholes and conduit (rigid metal).
   6. Traffic signal span wire and traffic signal cabling.
   7. Video detection equipment.

C. Temporary Signalization Plan: Submit plan showing maintenance of traffic signal operations during removal and installation.
   1. Indicate temporary signal plan operations.
   2. Indicate if temporary phasing and timing operations are required.
   3. Indicate temporary loading of utility poles to facilitate the installation.

D. Materials Certificates: Material Certifications will be required confirming the conformance to the requirements set forth in these plans or specifications or both.

E. Product warranty information.

1.05 NOTICE TO CONTRACTOR TRAFFIC CONTROL SIGNAL WORK

A. The Contractor is hereby notified that certain conditions pertaining to the installation of new signals and maintenance of traffic signal operations are required, as part of this contract.

B. Qualified/Unqualified Workers with respect to traffic control signal work and electrical contracting are defined by the U.S. Department of Labor per the following section of the regulations:

U.S. Department of Labor
Occupational Safety & Health Administration (OSHA) www.osha.gov
Part Number 1910
Part Title Occupational Safety & Health Administration
Subpart S
Subpart Title Electrical
Standard Number 1910.333
Title Selection and use of work practices

Completion of this project will require Contractor employees to be near overhead utility lines. All workers and their activities when near utility lines shall comply with the above OSHA regulations. In general, unqualified workers are not allowed within 10 feet of overhead, energized lines. It is the contractor's responsibility to ensure that workers in this area are qualified in accordance with OSHA regulations.

C. This project includes countdown pedestrian signals. The countdown display is allowed only during the flashing don't walk time of the pedestrian movement.

D. Keep in operation all vehicle and pedestrian signals including necessary support structures; all vehicle and pedestrian detection; the pre-emption system; and coordination to the master, if in a system throughout the duration of the Work. Make new traffic control signal operational before removing existing equipment from service.

E. The contractor will be held liable for all damage to existing equipment resulting from his or his subcontractor's actions.

F. The contractor is advised that signal appurtenances (span poles, pedestals and controllers) when in or adjacent to sidewalks, shall be field located to provide a free path of not less than 3 ft. (0.9 meters).

1.6 NOTICE TO CONTRACTOR – SIGNAL TESTING AND ACCEPTANCE

A. The Contractor shall arrange for and provide all the necessary field tests, as directed by the Engineer, to demonstrate that the installation is in proper working order and in accordance with the plans and specifications.

B. An intersection acceptance test shall be conducted and successfully completed prior to acceptance of entire corridor intersections. The test is designed to demonstrate that the field equipment installed at each intersection is installed properly and that all functions are in conformance with the plans and specifications. The DOT reserves the right to make adjustments to the timing of the controllers during and after test periods. These timing adjustments shall not relieve the Contractor of any responsibility otherwise set forth in the Contract.

C. At locations where an existing traffic signal installation is to be revised / replaced, a preliminary functional test shall be conducted to allow the Contractor to transfer control of the intersection from the existing traffic control equipment to the new equipment. The Connecticut Department of

Transportation must be contacted when a preliminary functional test is scheduled. A qualified representative of the traffic controller manufacturer or distributor must be present to correct any technical malfunction that may occur. At that time the existing signal may be taken out of operation and removed. At no time shall the signal be left unattended in automatic operation unless authorized by the Engineer.

D. If the new signal is not operating properly, the old controller shall continue to operate the signal and the Contractor, at his own expense, shall make all necessary repairs, adjustments, changes or replacements promptly and to the satisfaction of the Engineer.

E. When all work is completed and the signal installation is operating properly, the new signal may be left on automatic operation and the existing signal may be taken out of operation and removed.

F. Upon completion of the installation and testing, the Contractor shall notify ConnDOT that the installation is complete and shall arrange a time for the City traffic engineer to conduct the Functional Inspection and complete the Intersection Acceptance Test of the traffic signal. A qualified representative of the traffic controller manufacturer or the distributor and the video detection manufacturer or the distributor must also be present during the Functional Inspection. A punch list of traffic signal items shall be provided to the Contractor as a result of the Functional Inspection.

G. A 30-day test shall start at the successful completion of the Functional Inspection and system integration, including communication with the traffic management center. All electronic equipment, including but not limited to the controller, video detector, conflict monitor, detector amplifiers, load switches and flasher shall be tested for proper operation for 30 consecutive days. During this testing period, all equipment shall operate without failure of any type. A new 30 day test shall begin each time a failure is identified and corrected. The 30-day working test period shall not start until the City traffic engineer has inspected the installation. The Contractor shall be responsible for all equipment installed until the 30-day test is terminated and all punch-list have been addressed and resolved. The 30-day working test period shall not be considered complete until final sets of cabinet wiring diagrams and a CADD/PDF in a CD format have been received by ConnDOT. The 30-day working test period will not apply to any equipment furnished by the State and installed by the Contractor.

H. The Engineer may adjust any timing during this period to fully test the functional operation of the equipment installed. If any failures are identified, the Contractor shall replace or repair the defective equipment within 24 hours of notification by the Engineer.

I. All necessary corrections and adjustments shall be made promptly by the Contractor so as to make the installation satisfactory to ConnDOT and at no additional cost.

J. When Intersection Acceptance Test is successfully completed and the 30-day test period has passed, the intersection shall be accepted by ConnDOT. It may be possible that all of the traffic signal controllers in the system have completed their 30-day functional test period before the traffic signal interconnect system has been completed.

K. The Engineer shall issue an acceptance letter to the Contractor or permitter if the traffic signal has been installed by permit, stating the 30-day test start and completion dates and relieving the Contractor from maintenance responsibility of the traffic controller. All traffic signal punch list items, identified at the inspection, shall be resolved prior to issuance of the acceptance letter. The party who assumes ownership shall also receive a copy of the acceptance letter. Completion of the 30-day test period relieves the Contractor of normal maintenance responsibility including accidental damage or vandalism. The Contractor shall repair or replace any equipment found to be defective or damaged due to poor workmanship or the Contractor's operations.

L. All tests and test equipment shall be supplied at the Contractor's expense.

PART 2 PRODUCTS

1.1 TRAFFIC CONTROL FOUNDATION – PEDESTAL

A. Conform to the requirements of Sub-Article 10.02.01 and 10.02.02 from the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges, and Incidental Construction", Form 816, including all supplemental specifications and amendments.

1.2 PEDESTAL

A. Conform to the requirements of Sub-Article 11.02.01 and 11.02.02 from the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges, and Incidental Construction", Form 816, including all supplemental specifications and amendments.

1.3 COUNTDOWN PEDESTRIAN TRAFFIC SIGNAL

A. Conform to the requirements of Sub-Article 11.06 from the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges, and Incidental Construction", Form 816, including all supplemental specifications, amendments, and as amended herein.

B. Pedestrian and countdown LED traffic signal modules shall be designed as a retrofit replacement for the message bearing surface of a nominal 16" × 18" pedestrian and countdown traffic signal housing built to the PTCSI Standard. The message-bearing surface of the module shall be supplied with an overlapping, full "hand" and "man" symbols that comply with PTCSI standard for these symbols for a message-bearing surface of the size specified

C. Materials shall conform to the requirements of Sub-Article 11.06 from the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges and Incidental Construction", Form 816, which is amended as follows

1. Section M.16.07 C. Optical Unit - Delete 2. LED: and replace with the following:

a. General
   1) Meet requirements of current MUTCD Section 4E.
   2) Meet current ITE specifications for Pedestrian Traffic Control Signal Indications - (PTCSI) Part 2: Light Emitting Diode (LED).
   3) Meet CT DOT, 2008 - 2010 Functional Specifications for Traffic Control Equipment; Section 5D, LED Pedestrian Signal with Countdown Timer.
   4) Meet EPA Energy Star® requirements for LED Pedestrian Signal Modules.

b. Operational
   1) Countdown display only during the flashing Pedestrian Clearance (Ped Clr) Interval. Timer goes blank at end of flashing ped clr even if countdown has not reached zero.

c. Physical
   1) Sealed optical module to prevent entrance of moisture and dust.
   2) Self-contained optical module, including necessary power supplies.
   3) Designed to securely fit into standard housing without the use of special tools or modifications to the housing.
   4) Identification information on module: manufacturer's name, model number, serial number, and date code.

d. Lens

1) The lens shall be an ultraviolet stabilized polycarbonate shell. The lamp unit shall be sealed to eliminate dirt contamination and be suitable for all weather conditions.

e. Optical
1) Multiple LED sources; capable of partial loss of LED's without loss of symbol or countdown message.
2) The LED circuitry shall prevent perceptible flicker over the voltage range specified above.
3) Two complete self contained optical systems. One to display the walking person symbol (walk) and the hand symbol (don't walk). One to display the countdown timer digits.
4) Visual Image similar to incandescent display; smooth, non-pixilated.
5) Pedestrian and countdown LED signal modules shall be designed to operate over the specified ambient temperature and voltage range, attract the attention of, and be readable by, a viewer (both day and night) at all distances from 3 m to the full width of the area to be crossed.
6) The luminous intensity of the LED pedestrian and countdown signal module shall not vary more than ± 10 % for voltage range of 80 VAC to 135 VAC.
7) Symbol and countdown digit size as shown on the plan.
8) Solid hand/person symbol; outline display not allowed.
9) Overlaid hand/person symbols and countdown digits arranged side by side.
10) Countdown digit display color: Portland Orange in accordance with ITE requirements.
11) Countdown digits comprised of two seven segments, each in a figure 8 pattern.
12) Photometric Requirements: Luminance, Uniformity, and Distribution in accordance with ITE requirements.
13) Color Uniformity in accordance with ITE requirements.
14) Blank–Out design; symbols and digits illegible even in direct sunlight when not illuminated.

f. Electrical
1) Operating voltage: 89 VAC to 135 VAC.
2) Low Voltage Turn-Off: 35 VAC.
3) Turn-On and Turn-Off times in accordance with ITE specifications.
4) Combined Hand – Countdown Digits wattage: > 20 Watts.
5) Input impedance at 60 Hertz sufficient to satisfy Malfunction Management Unit (MMU) requirements.
6) The LED pedestrian and countdown signal module circuitry shall include voltage surge protection against high-repetition noise transients and low-repetition noise transients as stated in Section 2.1.6, NEMA Standard TS-2, 1992.
7) Two separate power supplies. One to power the walking person symbol. One to power the hand symbol and the countdown digits.
8) Meet Federal Communication Commission (FCC) regulations concerning electronic noise.
9) Filtered and protected against electrical transients and surges.
10) The secured, color coded, 36 in (914 mm) long, 600V, 20 AWG minimum, jacketed wires, conforming to the National Electrical Code, rated for service at +105ºC, are to be provided for electrical connection
11) The LED pedestrian and countdown module shall be operationally compatible with the currently used controller assemblies. The LED pedestrian and countdown module shall be operationally compatible with conflict monitors.

12) The LED pedestrian and countdown module including its circuitry must meet Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of noise.

g. Chromaticity – the measured chromaticity coordinates of the LED signal modules shall conform to the chromaticity requirements as follows:
1) "Hand" shall be Portland orange, not greater than 0.390, nor less than 0.331, nor less than 0.997 – x.
2) Walking person shall be lunar white, x: not less than 0.290, nor greater than 0.330, y: not less than 1.5x – 0.175, nor greater than 1.5x – 0.130

h. Warrantee
1) Five years from date ownership is accepted.

2. Section M.16.07 F. Painting
a. Painting: All surfaces of the signal housing, door, and visors, inside and out, shall be finished with three coats of infrared-oven- baked paint before assembly. All brackets and hardware shall be painted dark green by the manufacturer. The color shall be No. 14056, Federal Standard No. 595.
1) First Coat—Primer: Shall be iron oxide baking primer and shall meet or exceed the requirements of FS TT-P-645.
2) Second Coat—Gray Enamel: Shall be light gray exterior baking enamel and shall comply with FS TT-E-489, #16251 or #16314 or #16376 gray.
3) Third Coat—Dark Green Enamel: Shall be DARK GREEN exterior-baking enamel and shall comply with A-A2962. The color shall be No. 14056, Federal Standard No. 595. The inside of the visors shall be according to FS TT-P-527. The color shall be lusterless black Color No. 37038 to comply with Federal Standard No. 595.

1.4 PEDESTRIAN PUSH BUTTON AND SIGN

A. Conform to the requirements of Sub-Article 11.07 from the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges, and Incidental Construction", Form 816, including all supplemental specifications, amendments, and as amended herein.

1. Article M16.08 – Pedestrian Push Button – Delete the entire section and replace with the following:

a. General
1) The Pedestrian push button and the sign shall meet the ADA requirement. The Accessible Pedestrian Signal (APS) shall be Advisor Fully Integrated Pedestrian Station manufactured by Campbell Company -: A pedestrian station based unit that provides audible, tactile, and visual signals to the pedestrian.
2) Accessible Pedestrian Signal (APS) shall provide pedestrians with visual and tactile information about the intersection crossing. At the pedestrian station, the APS shall provide the necessary information to understand the status of the walk display.

b. Audible
1) Locator tone shall provide the pedestrian with a tone indication that the intersection is equipped with APS and where it is.

2) Acknowledge tone shall provide the pedestrian with the information that they have placed the call.
3) Informational message shall inform the pedestrian about the crossing. Walk Cycle message shall inform the pedestrian when the Walk Sign is on.
4) The tone shall provide for “walk” and “don’t walk” intervals.

c. Visual
1) A red LED shall be lit when the pedestrian has placed a call.

d. Tactile:
1) There shall be a 2” ADA-compliant pedestrian push button that contains the vibro-tactile.

2. The APS consists of three separate components.

a. Pedestrian Station shall be Porcelain Enamel: Porcelain Enamel to meet the harshest conditions and remain vivid and intact. The steel substrate shall be coated with porcelain and heated to provide a unified surface that is impervious to ultraviolet light, corrosion, and stain. The sign bracket shall be 9”X15” to accommodate the sign as shown in the detailed drawing, contain the pedestrian push button with LED, and speaker.
b. The driver board mounts in the pedestrian signal head and connects to the controller inputs.
c. A sound dish mounts to the bottom of the pedestrian signal head, it monitors ambient noise levels at the crossing initiation point.

3. No special tools or programming devices are required to install the APS.

4. The driver board installs in the pedestrian signal head and is connected to the display incoming power.

5. The sound dish is installed through the bottom of the pedestrian signal head.

6. The pedestrian station is attached to the pole.

7. The controller inputs and 10 C cable are plugged into the back of the PPB.

8. Pedestrian Push Button Housing

a. Die cast aluminum meeting requirements of ASTM B85.
b. Designed to attach 9”x15” four-hole advisory sign type.
c. Flat back to facilitate surface mount.
d. Available hardware to either pedestal top-mount of pole side-mount on diameter range of 3 ½” to 15”.

9. Finish:

a. Electrostatic powder coated after chemically cleaned.
b. Color: Dark Green, No. 14056, Federal Standard No. 595.

1.5 TRAFFIC CONTROLLER AND FOUNDATION

A. Conform to the requirements of the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges, and Incidental Construction", Form 816, including all supplemental specifications and amendments.

1.6 SPAN POLE AND FOUNDATION

A. Conform to the requirements of the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges, and Incidental Construction", Form 816, including all supplemental specifications and amendments.

1.7 SPAN WIRE AND SPAN WIRE MOUNTED TRAFFIC SIGNALS

A. Conform to the requirements of the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges, and Incidental Construction", Form 816, including all supplemental specifications and amendments.

1.8 VIDEO DETECTION SYSTEM

A. Conform to the requirements of the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges, and Incidental Construction", Form 816, including all supplemental specifications and amendments.

PART 3 EXECUTION

2.01 SCOPE

A. Stake all Right Of Way prior to any work beginning and Call Before You Dig.

B. Locate all proposed equipment and mark out in field with paint and stakes. Conduct field visit with ConnDOT and Engineer to verify equipment locations prior to excavation.

B. Conform to the requirements of the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges, and Incidental Construction", Form 816, including all supplemental specifications and amendments.

2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for traffic control operations and the installation of all equipment and the public.
   1. Obtain required permits.
   2. Utilize traffic control with uniformed police officers as needed.
   3. Conduct operations to minimize effects on and interference with existing traffic operations.
   4. Do not close or obstruct roadways or sidewalks without permit.

2.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

2.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION